

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
21 April 2005 (21.04.2005)

PCT

(10) International Publication Number
WO 2005/034880 A3

(51) International Patent Classification⁷: **A61K 31/381**,
C07D 333/36, 333/38, 333/72

(74) Agent: **ELFIRI, Ivor, R.**; Mintz, Levin, Cohn, Ferris,
Glovsky and Popeo, P.C., Chrysler Center, 666 Third Av-
enue, New York, NY 10017 (US).

(21) International Application Number:
PCT/US2004/033386

(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US (patent), UZ, VC, VN, YU,
ZA, ZM, ZW.

(22) International Filing Date: 8 October 2004 (08.10.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/510,282 9 October 2003 (09.10.2003) US
60/566,634 28 April 2004 (28.04.2004) US

(63) Related by continuation (CON) or continuation-in-part
(CIP) to earlier applications:
US 60/510,282 (CIP)
Filed on 9 October 2003 (09.10.2003)
US 60/566,634 (CIP)
Filed on 28 April 2004 (28.04.2004)

(84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

(71) Applicant (*for all designated States except US*): **ATON
PHARMA, INC.** [US/US]; 33 Avenue Louis Pasteur,
Boston, MA 02115 (US).

Published:
— with international search report

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **MILLER, Thomas,
A.** [US/US]; 33 Avenue Louis Pasteur, Boston, MA 02115
(US). **WITTER, David, J.** [US/US]; 33 Avenue Louis
Pasteur, Boston, MA 02115 (US). **BELVEDERE, Sandro**
[IT/US]; Apt. 16G, 201 West 74th Street, New York, NY
10023 (US).

(88) Date of publication of the international search report:
1 September 2005

*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: **THIOPHENE AND BENZOTHIOPHENE HYDROXAMIC ACID DERIVATIVES**

(57) Abstract: The present invention relates to a novel class of hydroxamic acid derivatives having a benzothiophene or thiophene backbone. The hydroxamic acid compounds can be used to treat cancer. The hydroxamic acid compounds can also inhibit historic deacetylase and are suitable for use in selectively inducing terminal differentiation, and arresting cell growth and/or apoptosis of neoplastic cells, thereby inhibiting proliferation of such cells. Thus, the compounds of the present invention are useful in treating a patient having a tumor characterized by proliferation of neoplastic cells. The compounds of the invention are also useful in the prevention and treatment of TRX-mediated diseases, such as autoimmune, allergic and inflammatory diseases, and in the prevention and/or treatment of diseases of the central nervous system (CNS), such as neurodegenerative diseases. The present invention further provides pharmaceutical compositions comprising the hydroxamic acid derivatives and safe dosing regimens of these pharmaceutical compositions, which are easy to follow, and which result in a therapeutically effective amount of the hydroxamic acid derivatives *in vivo*.

WO 2005/034880 A3